REMARKS

Claims 19-24 and 31 have been examined. No claims have been amended. Claims 25 and 27-30 have been canceled, without prejudice, for filing in a divisional application. Reconsideration of the application in view of the following remarks is respectfully requested.

Restriction Requirement

Counsel notes that the restriction requirement has been made final. Accordingly, claims 25 and 27-30 have been cancelled, without prejudice, for subsequent filing in a divisional application.

Claim Rejections – 35 USC 103(a)

Claims 19-24 and 31 have been rejected under 35 USC 103(a) as being unpatentable over Nakamura *et al* in view of JP 62-238,062. This rejection is respectfully traversed.

As an initial comment, Counsel wishes to note that the corresponding application in Europe has been granted as EP 1 735 119B and has recently been allowed in Japan. In both Europe and Japan, the main method claim is the same as currently being claimed in claim 19 of the present application.

In rejecting independent claim 19, the office action alleges that Nakamura *et al* "show the invention as claimed except that they do not show how to preheat the mold". Applicant respectfully disagrees. More specifically, claim 19 does not merely require mold preheating—it requires "heating the first part of the die to a temperature above the liquidus temperature of the metal whilst maintaining the second part of the die at a temperature below the liquidus temperature of the metal" (emphasis added). The significance of heating the die parts as prescribed in method claim 19 is explained below. Because this limitation is clearly not found in Nakamura *et al*, claim 19 is distinguishable without amendment.

When casting a component from a metal, various problems may be encountered which give rise to unacceptable defects in the cast component. One such problem arises from premature or early solidification of molten metal in one part of the mould which can give rise to poor consolidation and porosity in the resulting cast component. Also, with metal matrix composites, additional problems include incomplete metal infiltration into a composite preform. The present invention as claimed in claim 19 overcomes the problem of premature solidification by "superheating" the first part of the die (*i.e.* heating the first part of the die above the liquidus temperature of the metal). This allows molten metal to fill the die cavity whilst maintaining the molten condition for a sufficient period to avoid the above problems and prevent poor consolidation, porosity and incomplete infiltration. At the same time, by maintaining the second part of the die at a temperature below the liquidus temperature of the metal, a sufficient thermal gradient is provided to achieve component solidification in an acceptable time frame.

Nakamura *et al* addresses the problem of premature solidification of molten metal when casting conductor rods of a squirrel-cage rotor. When molten metal is injected under pressure into a rotor core held in a die cavity, it solidifies to form the conductor rods before it solidifies to form axial end-connector rings. As a result, one of the axial end-connector rings forms whilst cut-off from the applied (hydrostatic) pressure giving rise to casting defects. Nakamura *et al* solves this problem by providing an additional compaction piston to apply pressure direct to molten metal solidifying to form the axial end-connector ring once the conductor rods have formed. There is no suggestion in Nakamura *et al* of heating the mold parts to overcome potential casting defects.

JP 62-238062 appears to address the problem of dimensional and shape changes when casting a component with a preform. Molten metal is force-fed unidirectionally through an internal mold housing the preform when mounted in an (external) casting mold. The casting mold includes a base seat plate with fine holes to allow molten metal to flow out of the internal mold and collect in a separate cavity. Although the internal mold is preheated, there is nothing to suggest that it is superheated to temperatures above the liquidus of the metal. The presence of the fine holes is intended to establish a flow of molten metal through the internal mould, presumably to negate problems of premature solidification in the preform.

Combining the teachings of Nakamura *et al* and JP 62-238062 does not teach the method of claim 19 since neither document discloses the possibility of heating a first part of the die to a temperature above the liquidus of the metal and a second part of the die to a temperature below the liquidus of the metal. Also, the use of preheating and the fine holes to allow molten metal to flow through the preform in JP 62-238062 would not seem to add anything to the arrangement in Nakamura *et al*. In the latter, flow of molten metal through the rotor core is not the problem, and hence preheating and providing fine holes to promote molten metal flow as taught by JP 62-238062 would not prevent premature solidification of molten metal forming the conductor rods in the rotor core.

Hence, for at least these reasons, claim 19 is distinguishable over the combination of Nakamura *et al* and JP 62-238062 without amendment. It is therefore respectfully requested that the section 103 rejection of claim 19 be withdrawn. Claims 20-24 and 31 depend from claim 19 and are distinguishable for at least the same reasons.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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